## **BEFORE THE**

## PUBLIC SERVICE COMMISSION OF

## **SOUTH CAROLINA**

**DOCKET NO. 2019-224-E DOCKET NO. 2019-225-E** 

In the Matter of:	)
South Carolina Energy Freedom Act (House	) DIRECT TESTIMONY OF
Bill 3659) Proceeding Related to S.C. Code Ann. Section 58-37-40 and Integrated	<ul><li>) BRIAN BAK</li><li>) ON BEHALF OF DUKE ENERGY</li></ul>
Resource Plans for Duke Energy Carolinas,	) CAROLINAS, LLC AND DUKE
LLC and Duke Energy Progress, LLC	) ENERGY PROGRESS, LLC
	)
	)

### I. INTRODUCTION AND PURPOSE

- 2 Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.
- 3 A. My name is Brian Bak and my business address is 139 E. 4<sup>th</sup> Street, Cincinnati, Ohio.
- 4 Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?
- 5 A. I am employed by Duke Energy Business Services, LLC, a service company affiliate of
- Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP," and
- 7 together with DEC, "Duke Energy" or the "Companies") as Manager DSM Analytics.
- 8 Q. PLEASE DESCRIBE YOUR CURRENT RESPONSIBILITIES AS MANAGER
- 9 **DSM ANALYTICS.**

- 10 A. I have primary responsibility for Energy Efficiency ("EE") forecasting and analysis across
- all Duke Energy jurisdictions. This includes contracting with third party vendors to conduct
- Market Potential Studies ("MPS") of EE and Demand-Side Management ("DSM"),
- development of the EE forecasts utilized in Integrated Resource Plans ("IRPs") and long
- term fuel procurement planning, coordination with Duke Energy's EE/DSM program
- managers to develop content for IRP documents for DEC and DEP, and collaboration with
- the Duke Energy Integrated Systems and Operations Planning ("ISOP") team on issues
- 17 relating to EE and DSM.
- 18 Q. PLEASE BRIEFLY SUMMARIZE YOUR EDUCATION AND PROFESSIONAL
- 19 **QUALIFICATIONS.**
- 20 A. I received a Bachelor of Science degree in Management from New School University in
- June of 1994. In June 2004, I received a Master of Business Administration degree from
- Northwestern University with concentrations in Finance and Strategy.

### Q. PLEASE SUMMARIZE YOUR WORK EXPERIENCE.

From August 2004 to January of 2006, I was employed by Cinergy Corporation working in Strategic Planning and Corporate Development. From January 2006 to July 2007, I was employed by Exelon Corporation working in Financial Planning and Analysis, focusing on long range financial planning and evaluation of key drivers of the company's financial forecasts. From August 2007 to July of 2010, I was employed as Manager of Strategic Planning with Emerson Electric Corporation, focusing on business planning and end market analysis. In August 2010, I accepted orders to return to active military duty as an Intelligence Officer in the United States Navy. I served until July 2014, including a deployment in support of operations in the Persian Gulf and North Arabian Sea.

In July 2014, I joined Duke Energy performing integrated resource planning for Duke Energy's Midwest jurisdictions. In June 2019, I accepted a role on the newly formed ISOP team, developing analytical processes and tools to improve the alignment and integration of system planning across the Generation, Transmission and Distribution domains. In March 2020, I assumed my current position as Manager, DSM Analytics.

- 16 Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE
  17 COMMISSION OF SOUTH CAROLINA ("COMMISSION")?
- 18 A. No.

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

- 19 Q. ARE YOU INCLUDING ANY EXHIBITS IN SUPPORT OF YOUR TESTIMONY?
- 20 A. Yes. I am sponsoring two exhibits which are described below:
- **Bak DEC/DEP Exhibit 1** is the list of EE/DSM programs available as December 31, 2019, as described in Appendix D to each of the IRPs.

- 1 Bak DEC/DEP Exhibit 2 is the South Carolina version of the EE and DSM Market 2 Potential Studies filed as Attachment V to each of the Companies' IRPs.
- 3 Q. FOR WHAT REASON ARE YOU OFFERING THESE DOCUMENTS AS
- 4 **EXHIBITS?**
- 5 Bak DEC/DEP Exhibit 1 is being offered for the Commission's reference and information. Α.
- Bak DEC/DEP Exhibit 2, the South Carolina MPS, is being provided as the Companies 6
- 7 found the Market Potential Studies to be reasonable assessments of market potential energy
- 8 savings, and the Companies relied upon the studies in the development of their IRPs as
- 9 discussed in more detail below.

#### 10 WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING? Q.

- 11 A. The purpose of my testimony is to provide an overview of the Companies' current suite of
- 12 DSM programs and EE programs that were considered in formulating DEC's and DEP's
- 13 IRPs that are before this Commission pursuant to Act 62. I discuss the history of these
- 14 programs and the results achieved under them. Specifically, my testimony discusses the
- 15 programmatic inputs used to meet the statutory requirement that the Companies' IRPs
- 16 include consideration of customer EE and DSM programs as set forth in S.C. Code Ann.
- 17 §§ 58-37-40(B)(1)(e)(i). I also discuss the South Carolina EE and DSM Market Potential
- 18 Studies.

#### 19 Q. PLEASE SUMMARIZE YOUR TESTIMONY.

- 20 In my testimony, I provide an overview and background of the Companies' EE/DSM A.
- 21 programs, how the programs are developed and improved upon with the support of
- 22 stakeholder input, and how the Companies determine the cost-effectiveness of the EE/DSM
- 23 programs. I also discuss the recently completed Market Potential Studies—which provide

estimates of the technical, economic, and achievable potential for EE savings within the DEC and DEP service areas—and explain how the Companies used the Market Potential Studies for purposes of the IRP. Finally, I explain in my testimony the Companies' plans for additional winter demand-side peak savings.

### II. HISTORY AND STRUCTURE OF THE COMPANIES'

### CURRENT EE/DSM PROGRAMS

### Q. WHAT ARE ENERGY EFFICIENCY AND DEMAND SIDE MANAGEMENT

### PROGRAMS?

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

A.

EE programs are those which improve the energy efficiency of customers to the end of reducing their electricity consumption. For IRP purposes, the resulting EE-based demand and energy savings are treated as a reduction to the load forecast, which also serves to reduce the associated need to build new supply-side generation, transmission and distribution facilities. DSM programs, also sometimes referred to as demand response programs, are programs that prompt customers to reduce electricity use during select peak hours as specified by the Companies. The IRPs treat these "dispatchable" types of DSM programs as resource options that can be dispatched in lieu of additional traditional generating assets to meet system capacity needs during periods of peak demand.

# Q. WHAT IS THE HISTORY OF THE CURRENT SUITE OF EE/DSM PROGRAMS

### LISTED IN THE COMPANIES' 2020 IRPS?

A. DEC initially obtained approval for its EE/DSM programs through an application filed in Docket No. 2009-166-E, which received the Commission's approval in Order No. 2009-336 issued on May 19, 2009. DEC's EE/DSM programs and associated cost recovery mechanism were later revisited and modified as approved by Order No. 2013-889 issued

in Docket No. 2013-298-E on December 20, 2013. On June 26, 2020, DEC filed an application proposing certain updates to the EE/DSM cost recovery mechanism in Docket No. 2013-298-E, which is currently pending before the Commission.

DEP initially obtained approval for its EE/DSM programs through an application filed in Docket No. 2009-190-E, which received the Commission's approval in Order No. 2009-374 issued on June 26, 2009. DEP's EE/DSM programs and associated cost recovery mechanism were later revisited and modified as approved by Order No. 2015-596 issued in Docket No. 2015-163-E on August 19, 2015. On June 26, 2020, DEP filed an application proposing certain updates to the EE/DSM cost recovery mechanism in Docket No. 2015-163-E, which is currently pending before the Commission.

# Q. HAVE THE ORIGINALLY PROPOSED PROGRAMS CHANGED SINCE THOSE WHICH WERE ORIGINALLY PROPOSED BY THE COMPANIES?

Yes. As explained in the IRPs, the Companies' EE and DSM suite of programs is designed to be flexible, with programs being evaluated on an ongoing basis so that program refinements and budget adjustments can be made in a timely fashion to maximize benefits and cost-effectiveness. Consistent with that flexibility, the programs have been modified from time to time as approved by the Commission. Initiatives are aimed at helping all customer classes and market segments use energy more wisely. The potential for new technologies and new delivery options is also reviewed on an ongoing basis in order to provide customers with access to a comprehensive and current portfolio of programs.

### Q. WHAT EE/DSM PROGRAMS ARE CURRENTLY OFFERED BY THE

### 2 **COMPANIES?**

1

- 3 A. The suite of EE/DSM programs available as December 31, 2019, are listed and described
- 4 in Appendix D to each of the IRPs, and the lists of programs are attached hereto as Bak
- 5 DEC/DEP Exhibit 1. Potential new programs and measures, and potential modifications to
- 6 existing programs and measures, are typically reviewed with the EE/DSM Collaborative
- 7 prior to being submitted to the Commission for approval.

### 8 Q. WHAT IS THE EE/DSM COLLABORATIVE?

9 The EE/DSM Collaborative serves as an advisory group of interested stakeholders who A. 10 provide insight and input to DEC and DEP as related to EE/DSM programs. The role of 11 the EE/DSM Collaborative was succinctly described in the Commission's order approving 12 the DEP EE/DSM cost recovery mechanism in 2015: "DEP will provide its Stakeholder 13 Collaborative with information relating to Programs and Measures either currently being 14 considered or planned for future consideration. DEP will also seek suggestions from its 15 Collaborative for additional Programs and Measures for its future consideration." Order 16 No. 2015-596 at 5, Docket No. 2015-163-E (Aug. 19, 2015). In short, DEC and DEP share 17 information about potential programs with the EE/DSM Collaborative and receive 18 feedback from its members.

## 19 Q. WHO ARE THE MEMBERS OF THE EE/DSM COLLABORATIVE GROUP?

- 20 A. The EE/DSM Collaborative is comprised of representatives from the following external organizations:
- Advanced Energy
- American Council for an Energy-Efficient Economy ("ACEEE")

1	Carolina Utility Customers Association
2	Clean Energy Technology Center at North Carolina State University
3	• Energy Futures Group
4	Environmental Defense Fund
5	Environmental and Energy Study Institute
6	Green Built Alliance
7	National Housing Trust
8	Nicholas Institute at Duke University
9	North Carolina Building Performance Association
10	North Carolina Department of Natural Resources
11	North Carolina Housing Coalition
12	North Carolina Justice Center
13	North Carolina Public Staff
14	North Carolina Sustainable Energy Association
15	• Sierra Club
16	South Carolina Association of Community Action Partnerships
17	• South Carolina Coastal Conservation League ("CCL")
18	South Carolina Energy Office
19	South Carolina Office of Regulatory Staff
20	• Southern Alliance for Clean Energy ("SACE")
01	Unstata Foravar

- 1 Q. YOU MENTIONED PROGRAM COST-EFFECTIVENESS. HOW DO THE
- 2 COMPANIES EVALUATE WHETHER AN EE/DSM PROGRAM IS COST-
- 3 **EFFECTIVE?**

- 4 A. The Companies evaluate the cost-effectiveness of EE/DSM programs from the perspective of program participants, non-participants, all customers, and total utility spending using
- or program participants, non participants, an education, and total during spending doing
- 6 the four California Standard Practice tests—the Participant Test, Rate Impact Measure
- 7 ("RIM") Test, Total Resource Cost ("TRC") Test and Utility Cost Test ("UCT")—to
- 8 ensure the programs can be provided at a lower cost than building supply-side alternatives.
- 9 The use of multiple tests can ensure the development of a reasonable set of programs and
- indicate the likelihood that customers will participate. The Companies will continue to seek
- approval from State utility commissions to implement EE and DSM programs that are cost-
- effective and consistent with the Companies' forecasted resource needs over the planning
- horizon. EE/DSM program screening is discussing in more detail on pages 265-266 of the
- DEC IRP and on pages 258-259 of the DEP IRP.
  - Q. ARE THE COSTS FOR EE/DSM PROGRAMS OFFERED BY THE COMPANIES
- 16 **DETERMINED ON A SYSTEM-WIDE BASIS?**
- 17 A. Yes. Both the EE and DSM program costs are determined on a system-wide basis and then
- allocated to DEC's and DEP's South Carolina retail customers based on retail sales and
- coincident peak demand. Because the avoided cost benefits are realized at a system level,
- the program costs should also be recognized in the same manner as the utility system
- benefits achieved by the EE and DSM programs. Additionally, running programs on a
- 22 system-wide basis provides economies of scale that would not exist were the North
- Carolina and South Carolina EE/DSM programs administered and accounted for

1 individually. These economies of scale help to keep costs low for customers and keep the 2 EE/DSM programs cost-effective, further saving ratepayers through robust EE/DSM portfolios. 3

#### III. **EE/DSM PROGRAMS IN THE CONTEXT OF**

### THE IRP AND LONG-TERM PLANNING

#### WHAT HAVE THE COMPANIES DONE TO EVALUATE THE POTENTIAL Q.

### IMPACT OF EE/DSM PROGRAMS ON ENERGY SAVINGS?

In 2019, the Companies commissioned EE/DSM Market Potential Studies to obtain estimates of the technical, economic and achievable potential for EE/DSM savings within the DEC and DEP service areas, the final report for which was prepared by Nexant Inc. Although the Market Potential Studies were required by NCUC regulations, they are system-based studies that cover the system potential for DEC and DEP. The analysis to develop the Market Potential Studies included three distinct scenarios: a Base scenario using the baseline input assumptions, an Enhanced scenario which considered the impact of increased program spending to attract new customers, and an Avoided Energy Cost Sensitivity where higher future energy prices result in increased economic and achievable EE/DSM savings potential. The final report was prepared by Nexant, Inc. in May 2020 with a final revision completed in June 2020. The South Carolina and North Carolina versions of the Market Potential Studies were filed as Attachment V to the IRPs in these proceedings, and I am including the South Carolina version again for ease of reference as Bak DEC/DEP Exhibit 2. The Companies found the Market Potential Studies to be a reasonable assessment of market potential energy savings, and the Companies relied upon the studies in the development of their IRPs as discussed in more detail below.

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

# 1 Q. PLEASE DESCRIBE HOW THE COMPANIES UTILITIZED THE MARKET 2 POTENTIAL STUDIES FOR PURPOSES OF THE IRPs.

- A. The EE/DSM savings contained in the IRPs were projected by blending the Companies' respective five-year program planning forecast into the long-term achievable potential projections from the Market Potential Studies. It should be noted that, while the results of the Market Potential Studies are suitable for IRP and other long-term planning purposes, the studies did not attempt to closely forecast short-term EE/DSM achievements from year to year.
- 9 Q. PLEASE DESCRIBE HOW EE PROGRAMS WERE EVALUATED USING THE
  10 MARKET POTENTIAL STUDIES.
  - A. Using the Market Potential Studies, the Companies prepared three sets of projections consistent with Act 62: (1) a Base EE Portfolio savings projection based on the Companies' respective five-year program plans for 2020-2024, which was blended together with the Base Scenario from the MPS for 2025-2035; (2) a High EE Portfolio savings projection also based on an adjusted five-year program plan for 2020-2024 and blended with the Enhanced and Avoided Energy Cost Sensitivity Scenarios contained in the Market Potential Studies for years 2025-2035; and (3) a Low EE Portfolio savings projection developed by applying a reduction factor across all measures in the Base EE Portfolio forecast as a way to forecast lower than expected adoption of all measures. This methodology is described on pages 35-36 of the DEC and DEP IRPs.

11

12

13

14

15

16

17

18

19

# Q. PLEASE DESCRIBE THESE THREE SETS OF PROJECTIONS IN MORE DETAIL.

- Nexant examined three scenarios for achievable potential: Base, Enhanced, and an Avoided Energy Cost Sensitivity. These scenarios provide a sensitivity for EE costs and benefits to understand how these market conditions and trends affect the costs and benefits of utility-sponsored programs over the studies' time horizon of twenty-five years:
  - Base scenario aligns with existing program portfolio, and includes existing EE
     programs and measures currently offered by DEC or DEP.
  - Enhanced scenario includes the Base scenario, but with increased program spending (via incentives) designed to attract new customers into the market for EE technology and program participation.
  - Avoided Energy Cost Sensitivity scenario covers the Base scenario, but with a
    sensitivity analysis around enhanced EE benefits which may occur if avoided
    energy costs were higher than current values. Higher benefits for EE may lead to
    additional cost-effective measures and increased achievable potential.

Based on feedback from stakeholders, the Companies developed the IRP High Case forecast using a combination of the increased Achievable Potential from the Nexant MPS Enhanced Case plus an estimate of the increased Potential associated with including the High Avoided Energy Costs Sensitivity. The High Avoided Energy Costs in the Enhanced Case Achievable Potential was not included in the original scope of the MPS as the High Avoided Energy Costs Sensitivity was only applied to the Base Case in the MPS. However, the Company increased the Enhanced Case by the same ratio that exists between the High Avoided Energy Sensitivity Case and the Base Case. This enabled the High Case to

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

represent the most optimistic scenario for EE program potential while maintaining the MPS as the basis for the forecast.

Stakeholders also requested that the Companies evaluate the impact associated with the inclusion of "Non-Energy Benefits" which, while not directly quantified in current avoided costs, can represent environmental or societal benefits which do not currently have a direct financial value. While the inclusion of Non-Energy Benefits was not explicitly modeled in the MPS, the inclusion of the High Avoided Energy costs to the High Case forecast is a reasonable proxy for including Non-Energy Benefits in the studies as they resulted in a higher Economic Potential due to higher Avoided Benefits being included.

As discussed in the Collaborative meetings related to the MPS, Nexant applied the TRC test to the Economic Potential Screen but also included a sensitivity to calculate the Economic Potential based on the UCT test which resulted in an increase to the Economic Potential. However, Nexant did not carry this UCT screen all the way through to Achievable Potential. Nexant expects customer adoption rates to be lower when using the UCT screen versus the TRC screen because many of the additional measures which might pass the UCT screen would require large expenditures on the part of customers and the utility incentive alone would not be sufficient to entice those customers to adopt that measure. In order to capture the impact of additional measures that did pass the UCT screen, the Companies applied a 10% increase to the Achievable Potential in the Enhanced Portfolio to simulate using the UCT screen for Economic Potential when creating the High Case forecast.

The approved scope of the MPS was to estimate Achievable Potential based on existing, known technologies, in common use; therefore, certain measures currently

offered by the Companies through the Non-Residential Custom program were not included in the scope of the MPS. These Custom measures are, by definition, technologies that might be unique to a specific customer and would therefore not be considered "existing, known technologies" for the purpose of the MPS. The Companies added a layer of "non-standard Custom Measures" to both the Base and High IRP forecasts to capture the impacts of these measures based on the Companies' past experience with and projected future potential of the Custom Program. In addition, the Company's Residential Program Managers are expecting to include certain future programs that were not assessed within the MPS so estimates for these additional programs were also added to both the Base and High Case forecasts.

The MPS, by definition, only includes measures that pass the Economic Potential screen; however, most Low-Income programs are not cost effective and therefore were not included in the Economic or Achievable Potential quantified in the MPS. To account for this, the Companies added a projection of additional Low-Income impacts based on the Companies' past experience with, and projected future potential of, the Low-Income Programs in both the Base and High IRP Forecasts.

# Q. PLEASE DESCRIBE HOW DSM PROGRAMS WERE EVALUATED AS PART OF THE MARKET POTENTIAL STUDIES.

For development of the DSM portion of the Market Potential Studies, the participation rate was determined by the incentive level and marketing inputs for each DSM scenario, assuming that the incentive is uniform across all customer segments within a given customer class. For the Base scenario, Nexant assumed the existing incentives for DSM programs would continue to be used. For the Enhanced scenario, Nexant assumed that the

existing incentive levels for each program would double. The resulting projections of achievable DSM potential are used to inform the development of the DSM forecast used in the IRPs.

For residential DSM forecasting, Duke Energy relies on participation rate estimates from the most recent EE-DSM market potential studies and per participant impacts, either estimated or historically verified, from the most current EM&V studies. The magnitude of residential DSM resources that can be acquired is fundamentally the result of customer preferences and predisposition to participate, program or offer characteristics (including incentive levels), and how the programs are marketed. The resulting DSM forecasts are derived from a combination of known near-term customer enrollments and terminations, anticipated program growth based on both historical trends and the future estimates discussed above, and new potential initiatives or program concepts which may originate from various reports such as the MPS or winter peak study. Certain programs, by virtue of their design, may be capable of providing both summer and winter capacity savings.

The methodology utilized for non-residential forecasts is a combination of historical growth patterns and accounting for known near-term enrollments and terminations. Large business demand response programs are actively marketed to all customer segments that are known to possess the flexibility to curtail load and have demands high enough to comply with program minimums, which means that there is a simultaneous effort to maximize both winter and summer resources. Although the programs provide flexibility in contracting for different winter and summer commitments due to seasonal variations in customers' loads and operational characteristics, the programs are designed to incent participants to provide curtailable demand year-round. This allows

1		for load reduction availability even in off-peak months when scheduled generation
2		maintenance, in conjunction with unseasonable temperatures or other weather events,
3		could lead to the need to call on DSM resources.
4	Q.	DID THE COMPANIES CONDUCT ANY OTHER PLANS OR ANALYSIS
5		RELATED TO EE/DSM?
6	A.	Yes. The Companies undertook a detailed study to examine the potential for additional
7		winter demand-side peak savings through innovative rate initiatives combined with
8		advanced demand response and load shifting programs that were outside of the scope of
9		the Market Potential Studies, as well as the deployment of Integrated Voltage/Var Control
10		("IVVC") technology. The IVVC deployment is discussed in more detail in Witness
11		Roberts' testimony; on pages 36 through 37 of the DEC and DEP IRPs; and in detail in
12		Appendix D of the DEC IRP at pages 276 through 284 and Appendix D of the DEP IRP at
13		pages 270 through 277.
14	Q.	PLEASE DESCRIBE THE COMPANIES' WINTER DEMAND-SIDE PEAK
15		SAVINGS EFFORTS.
16	A.	As described in the IRPs, in response to stakeholder input, the Companies engaged Tierra
17		Resource Consultants, who collaborated with Dunsky Energy Consulting and Proctor
18		Engineering, to undertake a detailed study of this issue. The Companies envision working
19		with stakeholders in the upcoming months and beyond to further investigate and deploy,
20		subject to regulatory approval, additional cost-effective programs identified through this
21		effort.
22		Preliminary results from this study show promise for additional winter peak

demand savings that could move the Companies closer to the high energy efficiency and

- demand response sensitivity identified in the IRPs. Over time, as new programs/rate designs are approved and become established, the Companies will gain additional insights into customer participation rates and peak savings potential and will reflect such findings in future forecasts which would be included in future EE/DSM filings.
- 5 Q. DOES THIS CONCLUDE YOUR TESTIMONY?
- 6 A. Yes. It does.